REMARKS

This is a full and timely response to the outstanding non-final Office Action mailed October 6, 2005. Reconsideration and allowance of the application and pending claims are respectfully requested.

I.   Claim Rejections - 35 U.S.C. § 102(b)

Claims 1-23 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Glover (U.S. Pat. No. 5,751,733). Applicant respectfully traverses this rejection.

It is axiomatic that "[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983). Therefore, every claimed feature of the claimed invention must be represented in the applied reference to constitute a proper rejection under 35 U.S.C. § 102(b).

In the present case, not every feature of the claimed invention is represented in the Glover reference. Applicant discusses Applicant's claims and the Glover reference in the following.

A.   The Glover Disclosure

Glover discloses a disc drive storage system that employs sector level and track level error corrections systems (ECSs). Glover, Abstract. As is described as Glover:

> A disc storage system is disclosed which comprises a sector level
> ECS for correcting errors within a sector during readback, and a track level
> ECS for correcting a sector *that becomes unrecoverable at the sector level*

either because the number of hard errors exceeds the error correction capability of the sector redundancy, or because the sector is unreadable due, for instance, to an inability to synchronize to the sector data. The sector level ECS is preferably implemented using a high order Reed-Solomon code capable of correcting multiple random burst errors, and the track level ECS is preferably implemented using a less complex error correction code such as byte XOR or a first order Reed-Solomon code.
[Glover, column 3, lines 47-59 (emphasis added)]

As is apparent from the above excerpt, Glover's ECS corrects sectors that become unrecoverable because the number of errors exceeds the error correction capability. As is further described by Glover:

As mentioned above, *there are two situations where a data sector on the disc may become unrecoverable*. First, the sector may become entirely unreadable due to an inability to synchronize to the sector data (because, for example, the preamble 6 or sync mark 8 have been corrupted by a defect on the medium). *The other possibility is that the sector becomes uncorrectable; that is, the number of hard errors exceeds the error correction capability of the sector level ECS. In these situations, the storage system pauses the data transfer and executes the track level error correction steps to recover the lost sector using the redundancy sector.*
[Glover, column 7, lines 16-26 (emphasis added)]

From the above excerpts, it is apparent that Glover system pauses data transfer *when data on the storage device is unrecoverable*, i.e., when the number of hard errors

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exceeds the error correction capability of the sector redundancy, or because the sector is unreadable due, for instance, to an inability to synchronize to the sector data.

Significantly, Glover does *not* disclose pausing data transfer when the number of errors exceeds an established threshold that is below the number of errors that exceeds the error correction capability of the sector redundancy. Indeed, Glover does not anticipate establishing a threshold at all. Instead, the natural limitations of system dictate the limitations, thereby obviating the need to set a "threshold" in Glover's system.

B. Applicant's Claims

1. Claims 1-8 and 22

Applicant's independent claim 1 provides as follows (emphasis added):

1. A method for pausing a transfer of data during a Verify command, the method comprising:

selecting at least one threshold value that is below a maximum number of errors beyond which the errors are uncorrectable;

determining a number of errors detected in the data being transferred during the Verify command;

comparing the number of errors with the at least one threshold value; and

pausing the transfer of data during the Verify command *if the number of errors exceeds the at least one threshold value*.

As is described above, Glover discloses pausing data transfer when data on the storage device is unrecoverable, i.e., when the number of hard errors exceeds the error correction capability of the sector redundancy. Because of this, the Glover system is *not*

used to "select at least one threshold value that is below a maximum number of errors beyond which errors are uncorrectable", as is required by claim 1. In fact, Glover teaches the opposite: data transfer is only paused when the maximum is reached.

Because of the nature of Glover's system, Glover also does not teach "comparing the number of errors with the at least one threshold value". Again, Glover anticipates no "threshold" at all. Moreover, it logically follows that Glover does not teach pausing the transfer of data during the Verify command "if the number of errors exceeds the at least one threshold value". Again, no such threshold value is established in Glover's system.

Applicant further notes that the Examiner even *admits* that Glover does not teach establishing such a threshold value. In particular, the Examiner states that "**Not specifically described** in detail **by Glover** is the step whereby an error threshold feature is selected" (Office Action, page 5). Applicant notes that a rejection under 35 U.S.C. § 102 requires that each and every claim limitation *is* specifically described, or at least is inherent. If not, there can be no anticipation under 35 U.S.C. § 102.

In view of the foregoing, claim 1, and its dependents, are allowable over Glover.

Regarding dependent claim 2, Glover does not teach "establishing a full error threshold value" or separately establishing "an erasure threshold value". Again, Glover establishes no thresholds at all.

Regarding dependent claim 3, Glover does not teach "determining the number of full errors and erasures in the codeword". In particular, Glover does not describe distinguishing between or separately determining the number of "full errors" and "erasures".

Regarding dependent claim 4, Glover does not teach "comparing the number of full errors with the full error threshold" and separately "comparing the number of erasures with

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the erasure threshold value". Again, Glover neither describes thresholds nor counts the number of full errors versus erasures.

Regarding dependent claim 5, Glover does not teach any "full error threshold" or "erasure threshold value" that are established at levels "below maximum levels at which an ECC decoder is capable of detecting and correcting errors". Again, no separate "full error" and "erasure" thresholds are established, and no thresholds at all are established at levels "below maximum levels at which an ECC decoder is capable of detecting and correcting errors".

Regarding dependent claim 7, Glover does not teach "wherein selecting at least one threshold value comprises setting at least one level at which the errors in said codeword are recoverable". Again, Glover's system only interrupts if the errors exceed the number at which data can be recovered.

Regarding dependent claim 22, Glover does not describe determining the number of errors detected in data being "transferred from a memory card". Indeed, Glover is silent as to such an aspect.

2.   Claims 9-15 and 23

Applicant's independent claim 9 provides as follows (emphasis added):

9.   A system for pausing a transfer of data during a Verify command, the system comprising:

means for providing a full error threshold value that is below a maximum number of errors beyond which the errors are uncorrectable;

means for determining the number of full errors in data being transferred from a data storage means during the Verify command;

means for comparing said number of full errors with said full error threshold value; and

means for pausing the transfer of data during the Verify command *if said number of full errors exceeds said full error threshold value.*

Regarding claim 9, Glover at least does not teach any of "means for providing a full error threshold value that is below a maximum number of errors beyond which the errors are uncorrectable", "means for comparing said number of full errors with said full error threshold value", or "means for pausing the transfer of data during the Verify command if said number of full errors exceeds said full error threshold value", at least for reasons described above in relation to claim 1. Claims 9-15 and 23 are allowable over Glover for at least those reasons.

Regarding dependent claims 10 and 11, Applicant refers above to the discussions of claims 3 and 4 above.

Regarding dependent claim 12, Glover does not teach "means for pausing said transfer of data when the "number of erasures exceeds" an "erasure threshold value". Again, Glover does not discuss tracking the number of "erasures" relative to any "erasure threshold".

Regarding dependent claim 23, Glover does not describe determining the number of errors detected in data being "transferred from a memory card". Indeed, Glover is silent as to such an aspect.

3. Claims 16 and 17

Applicant's independent claim 16 provides as follows (emphasis added):

16. A data-pausing system stored on a computer-readable medium used in conjunction with a computing device, the system comprising:

logic configured to establish a full error threshold value and an erasure threshold value;

logic configured to determine the number of full errors and the number of erasures in a codeword transferred from a data storage device to a host requesting one of a read command and a verify command;

logic configured to compare said number of full errors with said full error threshold value;

logic configured to compare said number of erasures with said erasure threshold value;

logic configured to pause the transfer of data if said number of full errors or erasures exceeds said full error threshold value or said erasure threshold value, respectively.

Regarding claim 16, Glover does not teach "logic configured to establish a full error threshold value and an erasure threshold value". As is described above, Glover contemplates no thresholds, much less a "full error threshold value" and a separate "erasure threshold value".

Furthermore, Glover does not teach "logic configured to determine the number of full errors and the number of erasures in a codeword transferred from a data storage device to a host requesting one of a read command and a verify command". In particular, Glover does not discuss separately counting the number of "full errors" and "erasures".

Glover also does not teach "logic configured to compare said number of full errors with said full error threshold value" or "logic configured to compare said number of erasures with said erasure threshold value". Again, Glover anticipates no thresholds. It logically follows that Glover does not compare "full errors" and "erasures" with respective threshold values.

Moreover, Glover does not teach "logic configured to pause the transfer of data if said number of full errors or erasures exceeds said full error threshold value or said erasure threshold value, respectively". Simply stated, Glover is silent as to transferring data if the "number of full errors or erasures exceeds" their respective threshold values.

Claims 16 and 17 are allowable over Glover for at least the above reasons.

4. Claims 18, 19, and 22

Applicant's independent claim 18 provides as follows (emphasis added):

18. A circuit for detecting errors in data and determining when to pause a transfer of the data and initiate an interrupt routine, the circuit comprising:

an error correcting code (ECC) encoder/decoder configured to detect and correct errors in a codeword being transferred;

a storage device interface in communication with said ECC encoder/decoder and a data storage device, said data storage device configured to store said codeword that is transferred to said host in response to said request; and

an *interrupt initiation circuit* in communication with said ECC encoder/decoder, the interrupt initiation circuit comprising:

a processor;

an erasure threshold register configured to store a first threshold value;

a full error threshold register configured to store a second threshold value; and

a *first comparator configured to compare said first threshold value with a number of erasures detected by said ECC encoder/decoder, said first comparator further configured to output an erasure indication that indicates whether or not said number of erasures exceeds said first threshold value.*

Regarding claim 18, Glover at least does not teach an interrupt initiation circuit comprising "an erasure threshold register configured to store a first threshold value", "a full error threshold register configured to store a second threshold value" or "a first comparator configured to compare said first threshold value with a number of erasures detected by said ECC encoder/decoder, said first comparator further configured to output an erasure indication that indicates whether or not said number of erasures exceeds said first threshold value", at least for reasons described in the foregoing. Claims 18, 19, and 21 are allowable over Glover for at least those reasons.

Regarding dependent claim 21, Glover does not describe a "second comparator configured to compare said second threshold value with a number of full errors detected by said ECC encoder/decoder, said second comparator further configured to output a full error indication that indicates whether or not said number of full errors exceeds said second threshold value" or "logic circuitry configured to receive said erasure indication, said full error indication, and a status indication from said ECC encoder/decoder, said logic circuitry being further configured to process the received indications in response to

a configuration request from a configuration register, said logic circuitry being further configured to initiate an interrupt of the processor that pauses the data transfer when the received indications meet criteria set by said configuration request".

5. Claim 20

Applicant's independent claim 20 provides as follows (emphasis added):

20. A method for determining when to pause the transfer of data, the method comprising:

establishing a full error threshold value;

establishing an erasure threshold value;

decoding a codeword being transferred from a data storage device;

indicating whether the codeword contains any errors;

determining the number of full errors;

determining whether the number of full errors exceeds the full error threshold value;

interrupting a processor and pausing the transfer of data if the number of full errors exceeds the full error threshold value;

determining the number of erasures;

determining whether the number of erasures exceeds the erasure threshold value;

interrupting the processor and pausing the transfer of data if the number of erasures exceeds the erasure threshold value.

Regarding claim 20, Glover does not teach "establishing a full error threshold value", "determining whether the number of full errors exceeds the full error threshold value", and "interrupting a processor and pausing the transfer of data if the number of full

errors exceeds the full error threshold value", for reasons discussed above. Similarly, Glover does not teach "establishing an erasure threshold value", "determining whether the number of erasures exceeds the erasure threshold value", and "interrupting the processor and pausing the transfer of data if the number of erasures exceeds the erasure threshold value". Claim 20 is allowable over Glover for at least those reasons.

C.   Conclusion

Due to the shortcomings of the Glover reference described in the foregoing, Applicant respectfully asserts that Glover does not anticipate Applicant's claims. Therefore, Applicant respectfully requests that the rejection of these claims be withdrawn.

II.   Claim Rejections - 35 U.S.C. § 103(a)

Claims 1-23 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Glover in view of Inouie et al. ("Inouie," U.S. Pat. No. 5,712,861) and Zook ("Zook," U.S. Pat. No. 5,600,662). Applicant respectfully traverses this rejection.

As has been acknowledged by the Court of Appeals for the Federal Circuit, the U.S. Patent and Trademark Office ("USPTO") has the burden under section 103 to establish a *prima facie* case of obviousness by showing some objective teaching in the prior art or generally available knowledge of one of ordinary skill in the art that would lead that individual to the claimed invention. *See In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). The Manual of Patent Examining Procedure (MPEP) section 2143 discusses the requirements of a *prima facie* case for obviousness. That section provides as follows:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teaching. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and reasonable expectation of success must be found in the prior art, and not based on applicant's disclosure.

In the present case, the prior art does not teach or suggest all of the claim limitations, and there is no suggestion or motivation in the prior art to modify the references to include those limitations.

As is indicated in the foregoing, Glover fails to teach multiple aspects of Applicant's claims. This fact is even admitted by the Examiner on page 5 of the Office Action. To address the shortcomings of the Glover disclosure, the Examiner relies on Inouie or Zook. In particular, the Examiner points to column 35, lines 44 et seq. of the Inouie reference and column 27, line 47 and column 29, line 55 et seq. of the Zook reference.

Beginning with the Inouie reference, Inouie states:

After this preprocessing step, C_2 decoding is carried out as described in the ninth embodiment, except that the remaining erasure flags are used to identify error positions. The parameters t_2 and t_b accordingly differ from the ninth embodiment: t_2 (the maximum number of erasures that can be

corrected) can be as large as the number of C_2 check symbols (d_2 -1), as noted above; t_b is a positive integer less than t_2.

If S_2 is the number of erasures and E is the number additional errors discovered in decoding of a C_2 codeword, and if the following inequality is satisfied, then the erasures and other errors are corrected unconditionally.

$$2E+S_2 \leq t_b$$

If this inequality is not satisfied, then the codeword is corrected only if E=0, meaning that only erasures are present, and only if there is no conflict between any of the corrections and the information stored in the soft correction memory. If any of the erasures are due to soft corrections, that is, the error patterns stored in the soft correction memory 101 for these erasures and the error patterns found in C_2 decoding must be identical. If conflicting error patterns are found for any soft corrections, the C_2 codeword is not corrected.

[Inouie, column 35, lines 44-66]

Not described in the foregoing, however, for example, are selecting at least one threshold value that is below a maximum number of errors beyond which the errors are uncorrectable, comparing the number of errors with the at least one threshold value, and pausing the transfer of data during the Verify command if the number of errors exceeds the at least one threshold value. Instead, Inouie only describes "identifying error positions". Furthermore, the Examiner does not *explain how* the above except from the Inouie reference teaches such features.

Turning to the Zook reference, Zook discloses a mere mathematical equation in column 27, line 47. The Examiner does not *explain how* this equation is relevant or how it teaches Applicant's claim limitations. Furthermore, Zook describes the following:

> When the number of errors in an interleave exceeds the correction power of a code, it is possible for the ECC syndrome bytes produced to be identical to those produced by some correctable set of errors. This is a miscorrection. Assuming that each error affects a single byte and that error values and locations gre random is given by: [equation omitted]
> [Zook, column 29, lines 55-65]

Again, the Examiner does not *explain how* this excerpt teaches Applicant's claim limitations.

As a further matter regarding the rejection under 35 U.S.C. § 103(a), Applicant objects as to the rejection as being clearly improper and clearly failing to state a *prima facie* case of obviousness. As is described above, Glover fails to teach many, if not most, of the limitations of claims 1-23. However, the Examiner does not address claims 1-23 individually in terms of how Inouie and/or Zook provide the missing teachings and instead *rejects all of those claims in a single paragraph*. Therefore, the Examiner has not addressed each and every limitation of those claims and further has failed to adequately describe the suggestion or motivation to combine the references and to modify Glover's system in view of the teachings of Inouie and Zook. Regarding the latter point, a vague statement that combination/modification would have been obvious to "optimize" Glover's system is clearly insufficient under 35 U.S.C. § 103(a).

With specific regard to Applicant's dependent claims, Applicant notes that none of the references teach establishing thresholds and using those thresholds to determine when to interrupt a data transfer, or establishing separate thresholds for "full errors" and for "erasures". If the Examiner is going to admit that Glover fails to establish thresholds, the Examiner *must* specifically address how Inouie and/or Zook teach setting such thresholds, basing interruptions on the thresholds, and creating separate "full error" thresholds and "erasure" thresholds.

In summary, it is Applicant's position that a *prima facie* for obviousness has not been made against Applicant's claims. Therefore, it is respectfully submitted that each of these claims is patentable and that the rejection of these claims should be withdrawn.
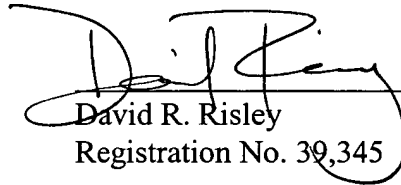

III.   New Claims

Claims 24 and 25 have been added into the application through this Response. Applicant respectfully submits that these new claims describe an invention novel and unobvious in view of the prior art of record and, therefore, respectfully requests that these claims be held to be allowable.

CONCLUSION

Applicant respectfully submits that Applicant's pending claims are in condition

for allowance. Favorable reconsideration and allowance of the present application and all

pending claims are hereby courteously requested. If, in the opinion of the Examiner, a

telephonic conference would expedite the examination of this matter, the Examiner is

invited to call the undersigned attorney at (770) 933-9500.

Respectfully submitted,

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